TERMINAL LEARNING OBJECTIVE

ACTION

State the operations of Conversion and Data circuits

CONDITION

Given a classroom environment, Computer Aided Instruction (CAI) workstation, NIDA 130 Electronic Trainer, Digital Multimeter w/test leads, Digital Logic Probe, and official OMEMS reference material.

STANDARD

Correctly answer 18 of 25 questions concerning Conversion and Data circuits.

CLASSIFICATION:	UNCLASSFIED
SAFETY CONSIDERATIONS:	ELECTRICAL SHOCK HAZARD
	ELECTOSTATIC DISCHARGE
ENVIRONMENTAL:	NONE
RISK ASSESMENT:	LOW

ENABLING LEARNING OBJECTIVE 1

ACTION

Describe the purpose and operation of analog to digital converters.

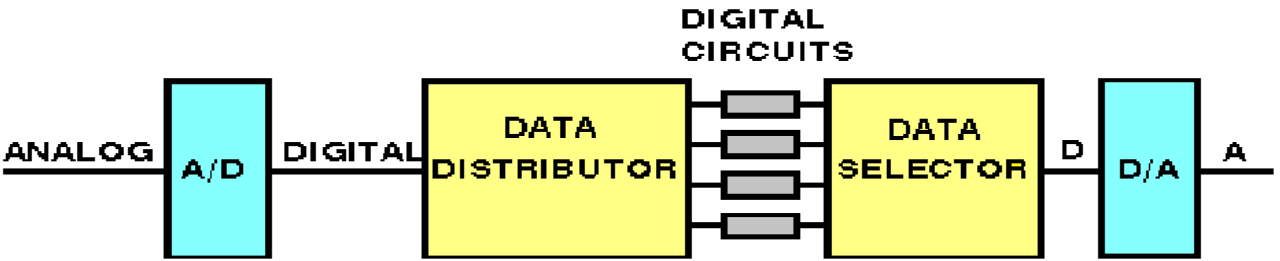
CONDITION

Given a classroom environment, Computer Aided Instruction (CAI) workstation, NIDA 130 Electronic Trainer, Digital Multimeter w/test leads, Digital Logic Probe, and official OMEMS reference material.

STANDARD

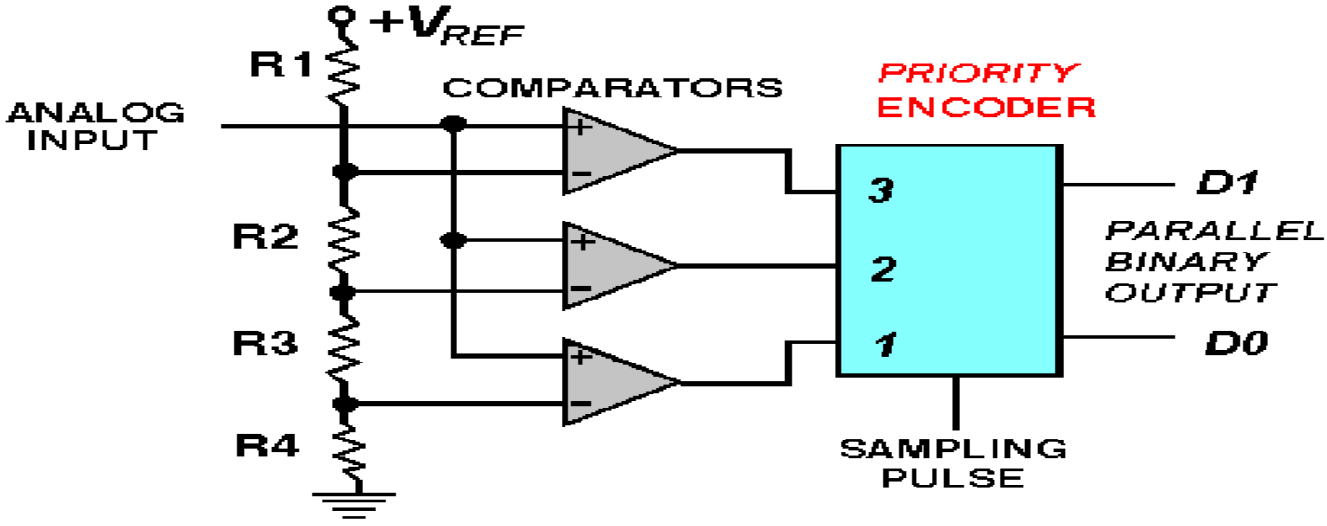
Correctly answer 18 of 25 questions concerning Conversion and Data circuits.

CONVERSION CIRCUITS	ANALOG TO DIGITAL
	DIGITAL TO ANALOG
DATA CIRCUITS	DISTRIBUTOR
	SELECTOR



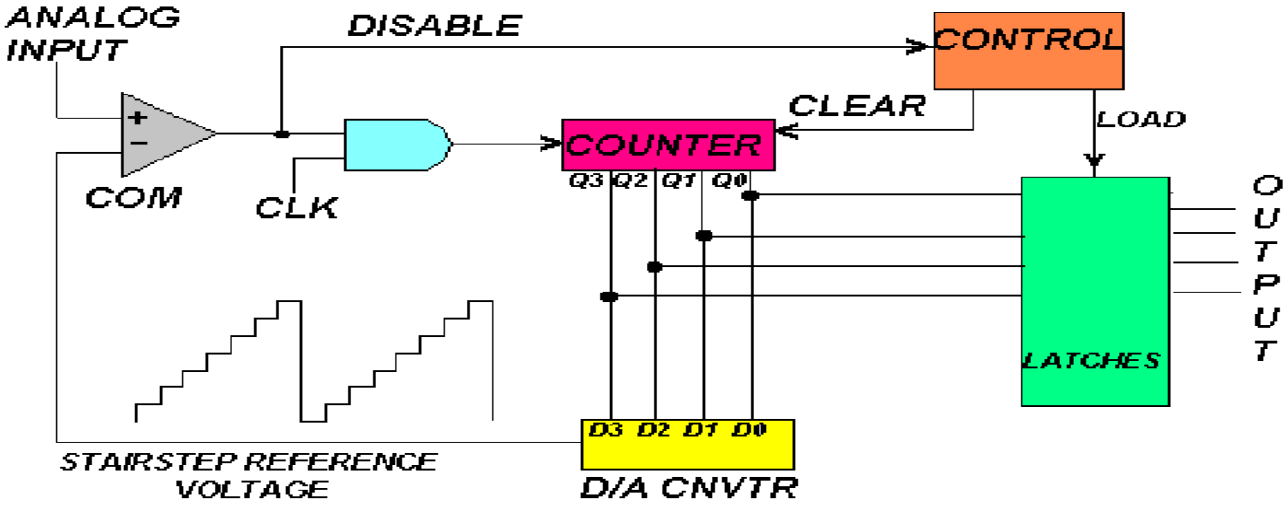
CONVERSION AND DATA CIRCUITS
BLOCK DIAGRAM

Circuit that changes analog signals to digital signals.



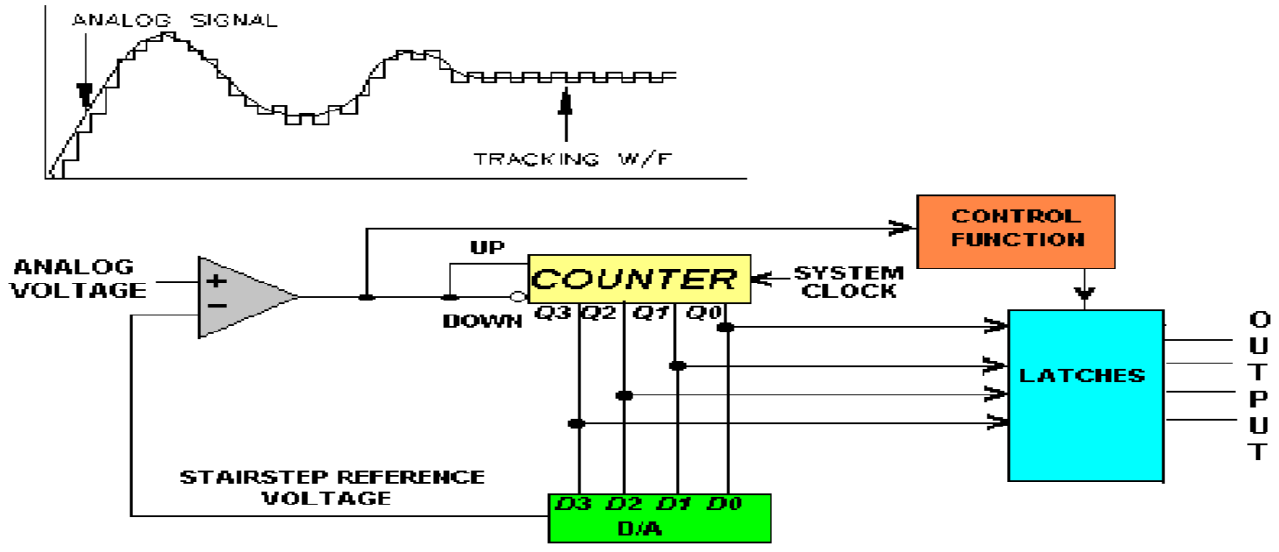
SIMULTANEOUS A/D CONVERTER

EL17-S05



STAIRSTEP RAMP A/D CONVERTER

EL17-S06



TRACKING A/D CONVERTER CIRCUIT

EL17-S07

What is a disadvantage of a Simultaneous A/D converter ?

1. Analog to digital conversion is fast
2. Analog to digital conversion is slow
3. Requires the use of a D/A converter
4. Requires numerous comparators

What type of A/D converter uses an up/down counter?

1. Simultaneous
2. Stair Step
3. Tracking
4. Scaling

ENABLING LEARNING OBJECTIVE 2

ACTION

Describe the purpose and operation of data distributor and data selector circuits

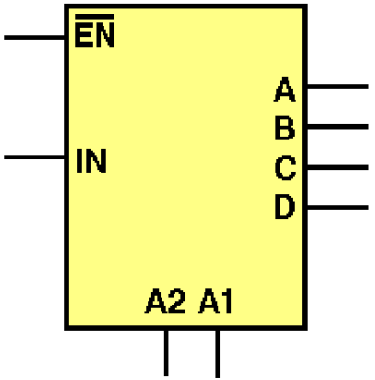
CONDITION

Given a classroom environment, Computer Aided Instruction (CAI) workstation, NIDA 130 Electronic Trainer, Digital Multimeter w/test leads, Digital Logic Probe, and official OMEMS reference material.

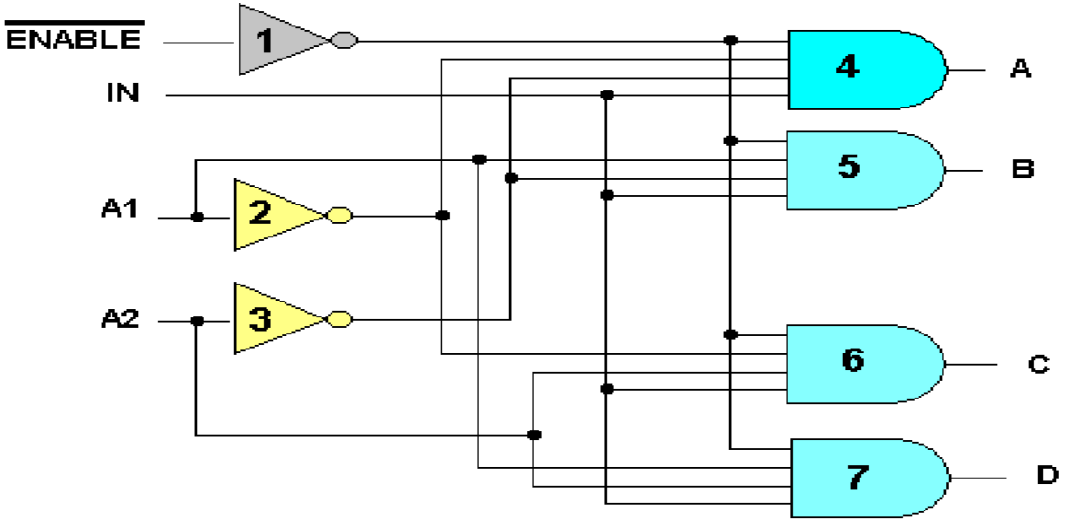
STANDARD

Correctly answer 18 of 25 questions concerning Conversion and Data circuits

Circuit that chooses one of several outputs for one input.



DATA DISTRIBUTOR



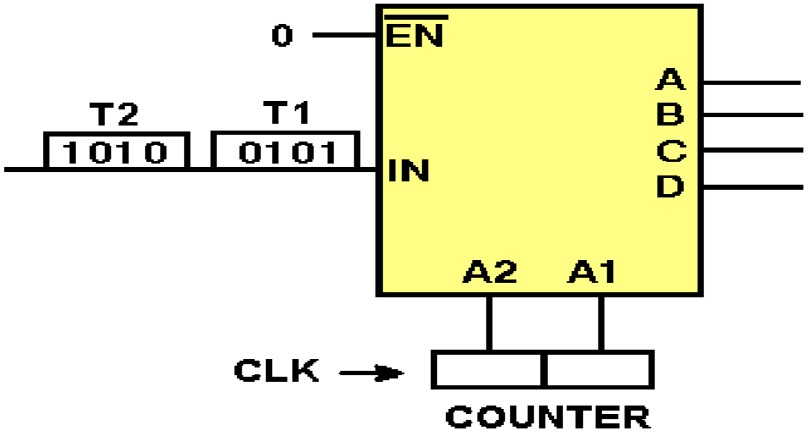
DATA DISTRIBUTOR
(Demultiplexer)

EL17-S09

A2	A1	$\overline{\text{ENABLE}}$	OUTPUT LINE
0	0	0	A
0	1	0	B
1	0	0	C
1	1	0	D

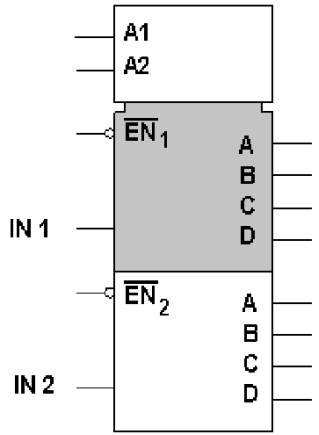
DATA DISTRIBUTOR TRUTH TABLE

The process of placing a single input on different output lines.



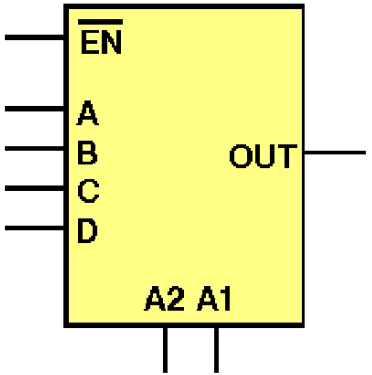
EL17-S11

DEMULTIPLEXING

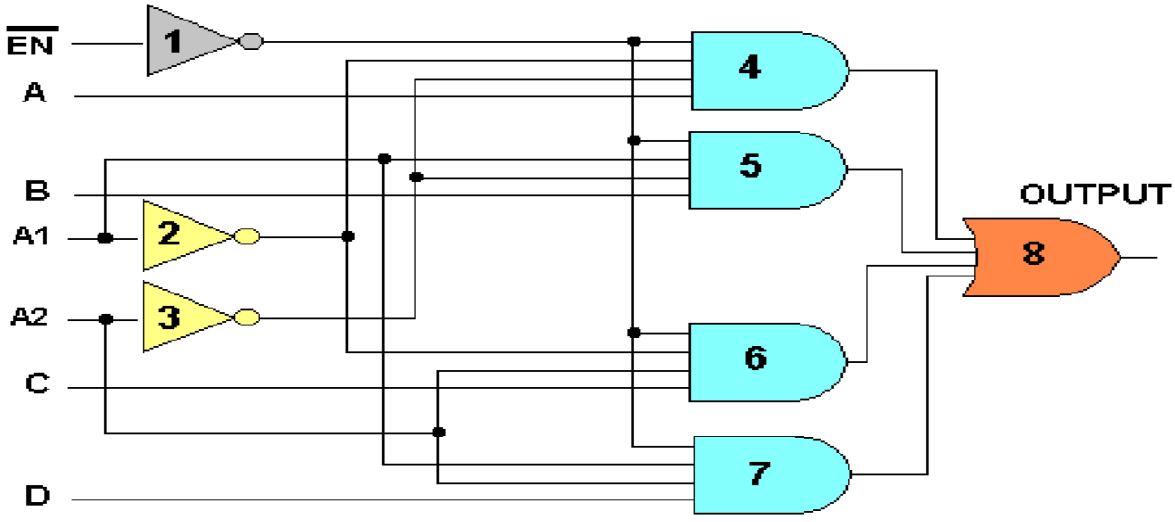


DATA DISTRIBUTOR IC

Circuit that chooses one of several inputs for one output



DATA SELECTOR



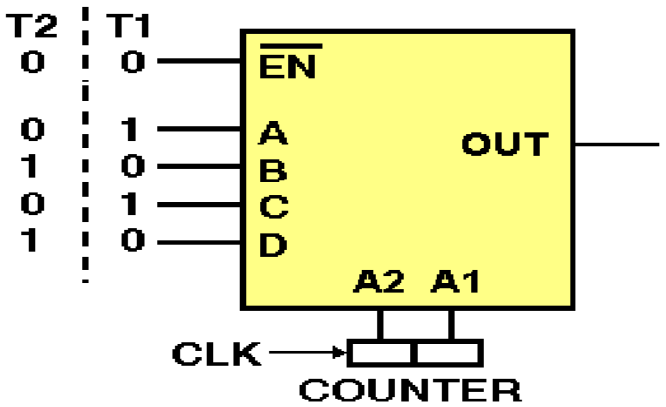
DATA SELECTOR
(Multiplexer)

EL17-S14

A2	A1	$\overline{\text{ENABLE}}$	INPUT LINE
0	0	0	A
0	1	0	B
1	0	0	C
1	1	0	D

DATA SELECTOR TRUTH TABLE

The process of placing each input on a single output line.



MULTIPLEXING

What is the process of using a single input and addressing each output during one clock pulse ?

1. SELECTING
2. DISTRIBUTING
3. MULTIPLEXING
4. DEMULTIPLEXING

What is the function of a data distributor circuit ?

1. Change analog to digital
2. Change digital to analog
3. Chooses one of several inputs for an output
4. Chooses one of several outputs for one input

What is the function of a data selector circuit ?

1. Change analog to digital
2. Change digital to analog
3. Chooses one of several inputs for an output
4. Chooses one of several outputs for one input

What is the process of using a single output line and addressing each input during one clock pulse ?

1. SELECTING

2. DISTRIBUTING

3. MULTIPLEXING

4. DEMULTIPLEXING

ENABLING LEARNING OBJECTIVE 3

ACTION

Describe the purpose and operation of digital to analog converter circuits.

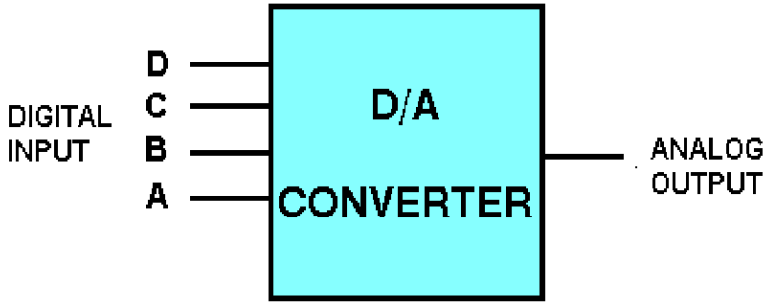
CONDITION

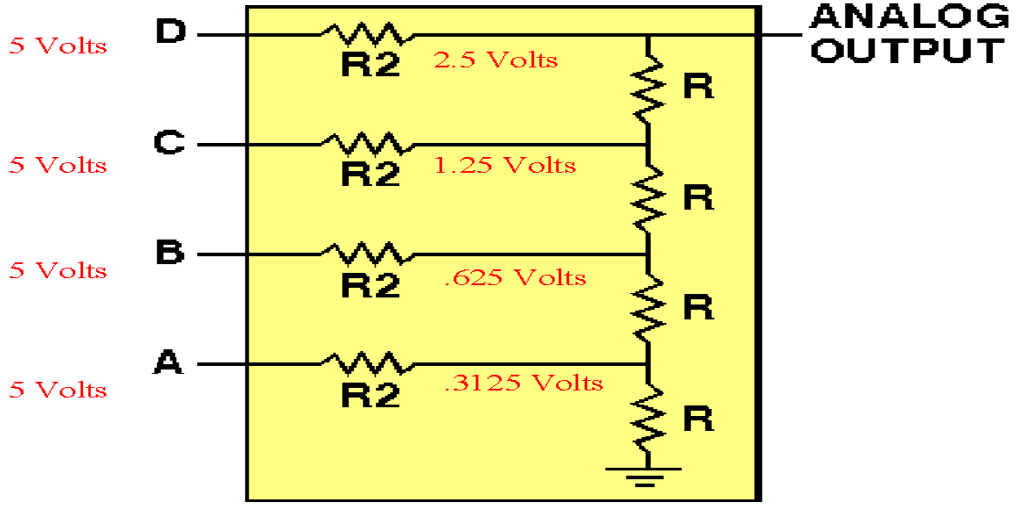
Given a classroom environment, Computer Aided Instruction (CAI) workstation, NIDA 130 Electronic Trainer, Digital Multimeter w/test leads, Digital Logic Probe, and official OMEMS reference material.

STANDARD

Correctly answer 18 of 25 questions concerning Conversion and Data circuits.

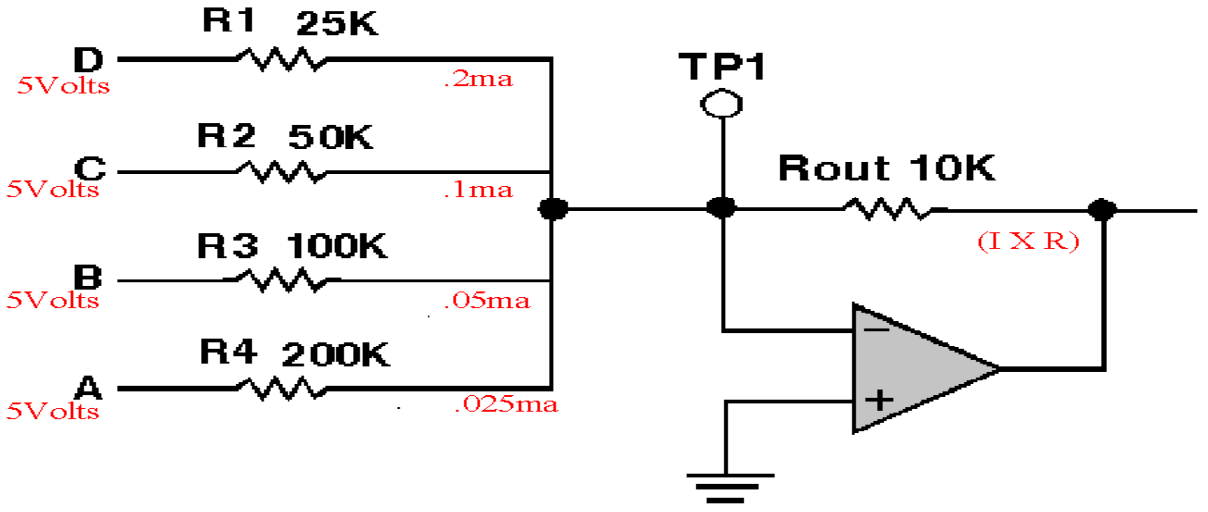
Circuit that changes digital signals to analog signals.





4 BIT SCALING D/A CONVERTER

EL17-S18



WEIGHTED D/A CONVERTER

EL17-S19

How many values of resistors are required to construct a D/A scaling resistor network ?

1. 1
2. 2
3. 3
4. 4

4-700-13

What are the value of the resistors used in a 4 bit weighting D/A converter ?

1. R, 2R
2. R, 2R, 4R
3. R, 2R, 4R, 8R
4. R, 2R, 4R, 8R, 16R

4-700-14

What is the resolution of a 4 bit binary scaled D/A converter ?

1. 1/16
2. 1/32
3. 1/64
4. 1/128

4-700-16

What type of D/A converter uses different values of resistors ?

1. STAIR STEP
2. TRACKING
3. SIMULTANEOUS
4. BINARY WEIGHTED

ENABLING LEARNING OBJECTIVE 4

ACTION

Complete CAI lessons on A/D converters, Data distributor, Data selector and D/A converter circuits.

CONDITION

Given a classroom environment, Computer Aided Instruction (CAI) workstation, NIDA 130 Electronic Trainer, Digital Multimeter w/test leads, Digital Logic Probe, and official OMEMS reference material.

STANDARD

Correctly answer 18 of 25 questions concerning Conversion and Data circuits.

ENABLING LEARNING OBJECTIVE 5

ACTION

Perform troubleshooting procedures on Conversion and Data circuits

CONDITION

Given a classroom environment, Computer Aided Instruction (CAI) workstation, NIDA 130 Electronic Trainer, Digital Multimeter w/test leads, Digital Logic Probe, and official OMEMS reference material.

STANDARD

Correctly identify 10 of 10 malfunctions in Conversion and Data circuits.